IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

INDUCTION MOTOR MONITORING AND CONTROLLING USING LABVIEW

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Abstract: The induction motor has remained the most popular type of motor for industrial applications. The primary advantage of the induction motor is its straight forward rotor construction leading to low cost, ruggedness, and low maintenance requirements. A module of transducers and sensors monitors the parameters like Temperature, external moisture RPM, vibrations, load current and voltage of induction machine and send to the processing unit using DAQ, which will analyzed and display the parameters in Virtual instrument. Based on the threshold values of the parameters, the system will send the command signal through DAQ to the motor driver, it makes motor ON or OFF. it has manual control also to stop or start motor.

Index Terms **- Induction Motor, DAQ, Temperature, speed, voltage, load current, LabVIEW.**

I. INTRODUCTION

Before the Invention of AC Induction Motors DC motors widely used. The Primary Advantages of the Induction motor are its straight forward rotor construction leading to low cost ruggedness, low maintenance. The performance of Ac motor depends on Electrical and mechanical so that the control of parameters is very sensitive. All Electrical and Mechanical and Environmental parameters like current, voltage speed, vibrations, temperature and external moisture of the motor are very important for a drive system. Recent Advantages in processing technology the Availability of fast processing ,stable and sensitive products provided particular benefits in Industrial Automation .This brings a new Technology of "SMART INDUSTRIES" in the new area of Monitoring as Well as Controlling of Various Applications. With virtual instrumentation and graphical system design, researchers can develop such applications with less effort, time, and resources while taking advantage of the most recent hardware and gives such a efficient result. So LabVIEW providing the best way for Industrial Automation .Here LabVIEW is used for Monitoring and controlling and controlling the AC Induction Motor

II. BLOCK DIAGRAM

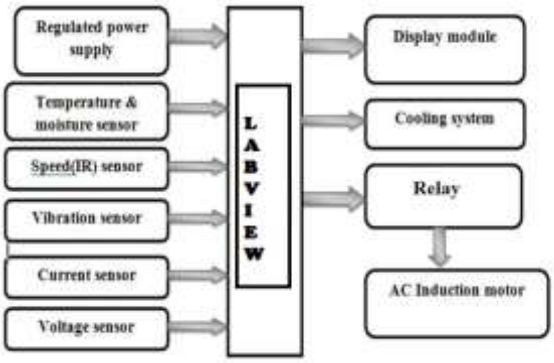


Fig.1. Block diagram

III. DAQ

Data acquisition is the process of sampling signals that measure real world physical conditions and converting the resulting samples into digital numeric values that can be manipulated by a computer. Data acquisition (DAQ) is the process of measuring an electrical or physical phenomenon such as voltage, current, temperature, pressure, or sound with computer Data acquisition systems, abbreviated by the acronyms DAS or DAQ, typically convert analog waveforms into digital values for processing. The components of data acquisition

systems include: Sensors, to convert physical parameters to electrical signals. Signal conditioning circuitry, to convert sensor signals into a form that can be converted to digital values. Analog-to-digital converters, to convert conditioned sensor signals to digital values

Fig.2. USB DAQ 6009

IV. DESCRIPTION OF LABVIEW

LabVIEW is an abbreviation for Laboratory Virtual Instrument Engineering Workbench designed by Doctor James Truchard, Doctor Jeff Kodosky, founders of NI Company, and their friend which names Jack McRiessen. It was first applied on the original Macintosh computer in May, 1986, which even predated the graphic operating system Windows launched by Microsoft.

The program LabVIEW developed by NI Company consists of three major functional parts: functional operation and graphic display of virtual instrument; design and edit of background programs; selection and connection of sub programs. LabVIEW is a graphical programming language that uses icons instead of lines of text to create applications. In contrast to text based programming languages, where instructions determine program execution, LabVIEW uses dataflow programming, where the flow of data determines execution order. They are realized by the following three modules:

4.1 Front Panel

Front panel includes controls and indicators and it is a tremendously important part of virtual instrument. All of these depend on the virtual graphical interfaces of the front panel, which make real interactions between computers and users possible and every VI displays an icon in the upper right corner of the front panel window and block diagram window.

4.2 Icons and Connectors:

The subprograms are named as subordinate VI as well which are represented by icons that can be used by the master program with connector, connector pane defines the inputs and outputs you can wire to the VI so you can use it as a subVI on it.

4.3 Operation Panel of LabVIEW

In order to make the operations of users more convenient and efficient, LabVIEW provides three different sets of operating panels which appropriately classify different types of functional modules. Users can conveniently choose any of the three in their own needs, which include.

4.4 Tools Palette:

The tools palette is a graphical user interface (GUI) element it provides adjustment and modification tools for LabVIEW including icon lead selection, program debugging, text control, front panel color modification and such as those that create lines and shapes or selection tools and edit tools.. After users click one of the functions icons, the mouse pointer will turn into that icon which means the corresponding function will be activated and placed. If the mouse pointer stops over the subprograms or the icons of the back panel, the corresponding tooltip window will appear and it has a common graphical user interface element.

Fig.3 Tools Palette.

4.5 Controls Palette:

This palette mainly changes its settings depending on the type of object selected and also adds various virtual control switches and VIO to the front panel. Users can not only add suitable virtual control icons according to different targets and accuracies of the design programs, but also beautify interactive interfaces by using this palette and advantage less chance to over mixing.

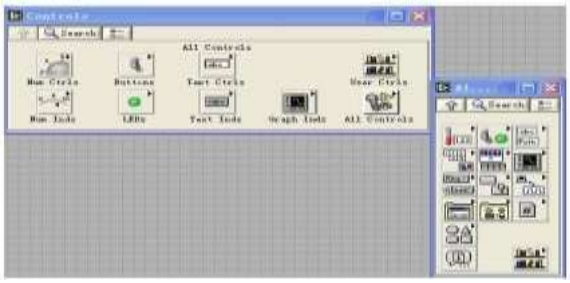


Fig.4 Controls Palette

4.6 Functions Palette:

The Function Palette it is tool to set up the flowchart program and contains buttons for functions that are already configured through expanded Desktop Binder functions. It includes the basic operations module, signal 14 processing module and hardware interaction module.

Fig.5 Function palette.

V. SENSORS

The sensors which are used in this work is listed and its functions explained.

5.1 Hall Effect Sensor

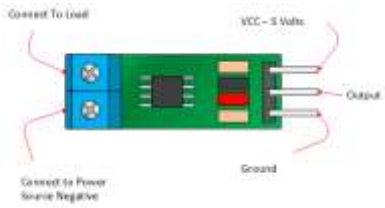


Fig.6 Current Sensor.

A current sensor is a device used to detect electric current in a wire, and generates a signal proportional to that current. The generated signal could be either Analog voltage or current or even an digital output. The generated signal can be used to display the measured current in an ammeter, or can be stored for further analysis in a data acquisition system, or can be used for the purpose of control. The sensed current and the output signal.

5.2 Temperature Sensor

Fig.7 Temperature Sensor.

LM35 is an integrated circuit sensor (Temperature sensor) can be used to measure temperature with an electrical output proportional to the temperature (in °C). It can be measure temperature more accurately than a by using a thermistor. The sensor circuit is sealed and not subject to oxidation. The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplified. In LM35 has output voltage is proportional to the Celsius temperature. The scale factor is .01V/°C.

5.3 Vibration Sensor

Fig.8 Vibration Sensor.

The vibration sensor is a type of accelerometer but an accelerometer is not necessarily a vibration sensor. But the vibration sensors, measure a quantity of acceleration and are therefore a type of accelerometer, are by definition accelerometers.

The three parameters representing motion detected by vibration monitors are 1.Displacement 2.Velocity 3. Acceleration. These parameters can be measured by using variety of motion sensors and are mathematically related (displacement is the first derivative of velocity and velocity is the first derivative of acceleration). The Selection of a sensor proportional to displacement, velocity or acceleration. It depends on the frequencies of interest and the signal levels involved.

5.4 Speed Sensor

Fig.9 Speed Sensor

IR(Infrared Radiation) sensor is used to calculate the speed of the motor. The sensor having the two nodes called it has transmitter and receiver. It emit the infrared radiation which is later received by the receiver. During the process of the emission and receiving, by the object of interest. The property is used to generate desired output with help of the electronic circuit. It has a three terminals Vcc , GND and output. The IR sensor used the 5V dc as working voltage. Light emitting diode(LED) used to emit and receive the signals.

5.6 Transformer

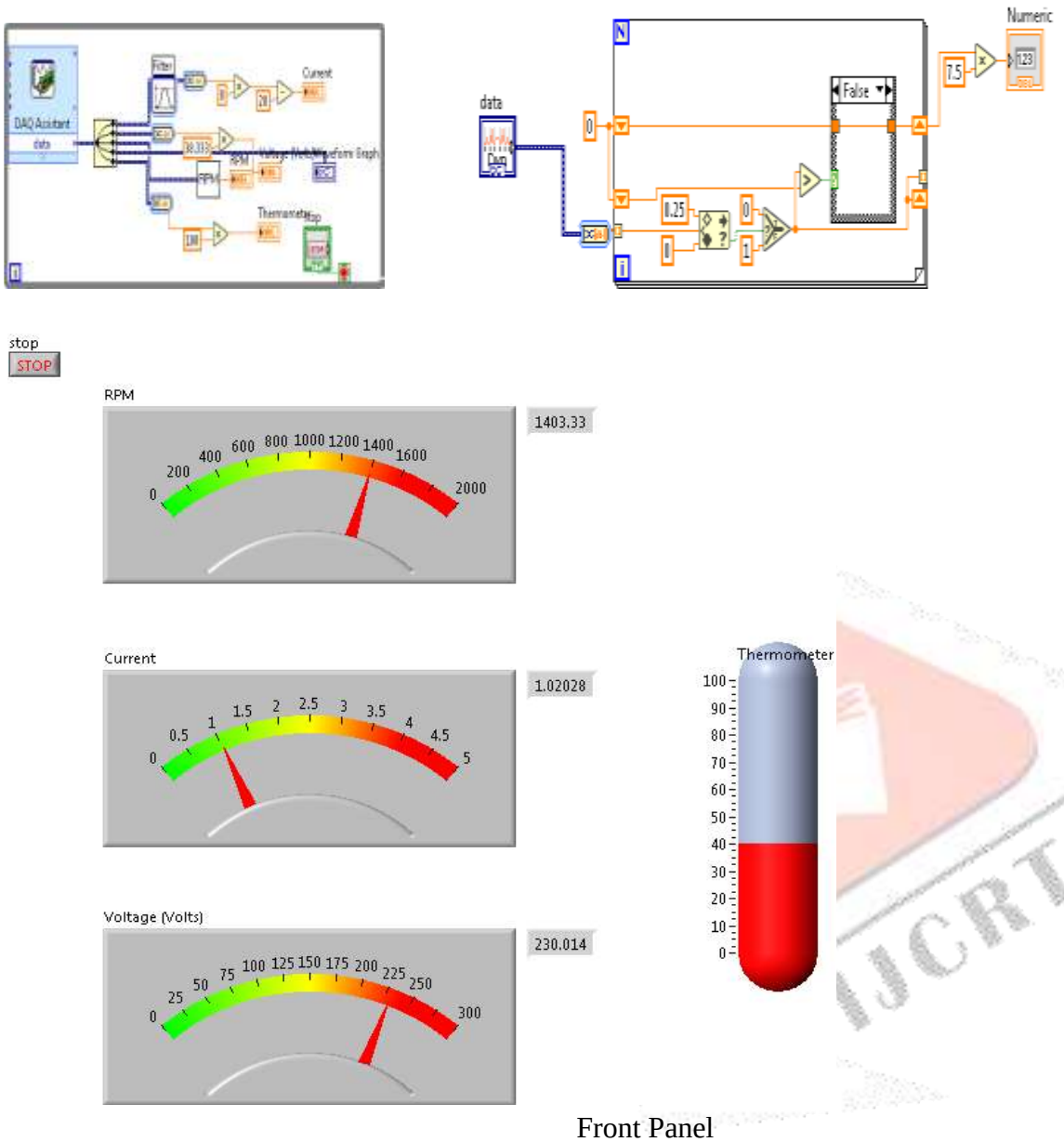
Fig.10 Transformer

Transformer 6-0-6 means it is a 12 v centre tap transformer this type which has 6v output with respect to its centre tap terminal at either end, while there is 12 v across the ends of the secondary. But we can use either end terminal of transformer secondary or a centre tap

terminal as line-neutral supply. In this type of transformer is frequently used with a full-wave rectifier using two diodes, in this case to provide a 6 v supply.

VI. VIRTUAL INSTRUMENT & CONCLUSION

The figure shows the front panel of Induction motor monitoring Virtual Instrument. The VI shows Induction motor speed as 1403.33RPM, Current 1.02 A, Voltage 230.03 V, Temperature 40^0 C.



Front Panel

The system has been designed to combine various parameter measurements in real-time, improving the detect ability of different faults. LabVIEW is presented here for monitoring and controlling the motor.The monitoring of the motor system presents the measurement of different parameters namely vibrations, temperature, speed, moisture, voltage and current consumption.The system has a high autonomy, easy installation and low maintenance costs

REFERENCES

[1] M. Seera et al. Fault detection and diagnosis of induction motors using motor current signature analysis and a hybrid FMM–CART model. IEEE Transactions on Neural Networks and Learning Systems 23.1 (2012): 97-108.

[2] A. Pilloni et al. Fault detection in induction motors. AC electric motors control: Advanced Design Techniques and Applications (2013): 275-309.

[3] E. T. Esfahani, S. Wang, V. Sundararajan. Multisensor wireless system for eccentricity and bearing fault detection in induction motors. IEEE/ASME Transactions on Mechatronics 19.3 (2014): 818-826.

[4] K. M. Siddiqui, V. K. Giri. Broken rotor bar fault detection in induction motors using wavelet transform. International Conference on Computing, Electronics and Electrical Technologies (ICCEET), IEEE, 2012.

[5] A. Soualhi et al. Fault detection and diagnosis of induction motors based on hidden Markov model. Electrical Machines (ICEM), 2012 XX International Conference on. IEEE, 2012.

[6] L. Hou, N. W. Bergmann. Novel industrial wireless sensor networks for machine condition monitoring and fault diagnosis. IEEE Transactions on Instrumentation and Measurement 61.10 (2012): 2787-2798.

[7] M. Irfan et al. An on-line condition monitoring system for induction motors via instantaneous power analysis. Journal of Mechanical Science and Technology 29.4 (2015): 1483-1492.

[8] M. R. Mikhov et al. An application of wireless standards for remote monitoring of electric drive systems. International Journal of Engineering Research and Development 2.12 (2012): 30-36.

[9] K. M. Siddiqui, K. Sahay, V. K. Giri. Health monitoring and fault diagnosis in induction motor-a review. International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering 3.1 (2014): 6549-6565

[**10]** Magdum, A. D., &Agashe, A. A. (2016). "Monitoring and controlling the industrial motor parameters remotely using LabVIEW".2016 IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT).

[11] Abel C. Lima-Filho, Ruan D. Gomes, Marceu O. Adissi, Tassio Alessandro Borges da Silva, Francisco A. Belo, and Marco A. Spohn, "Embedded System Integrated Into a Wireless Sensor Network for Online Dynamic Torqueand Efficiency Monitoring in Induction Motors," IEEE/ASME transactions on mechatronics, Vol. 17, No. 3, June 2012.